

Patent
Serial No. 10/537,891
Appeal Brief in Reply to Final Office Action of October 16, 2008

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of

Atty. Docket: US020535US

WOJTEK SUDOL ET AL.

CONF. NO.: 7204

Serial No.: 10/537,891

Examiner: JOEL LAMPRECHT

Filed: JUNE 7, 2005

Group Art Unit: 3737

TITLE: MINIATURIZED ULTRASONIC TRANSDUCER

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Sir:

Appellants herewith respectfully present its Brief on Appeal
as follows:

REAL PARTY IN INTEREST

The real party in interest is Koninklijke Philips Electronics N.V., a corporation of The Netherlands having an office and a place of business at Groenewoudseweg 1, Eindhoven, Netherlands 5621 BA.

RELATED APPEALS AND INTERFERENCES

To the best of Appellants' knowledge and belief, there are no related appeals or interferences.

STATUS OF CLAIMS

Claims 1-27 are pending in this application. Claims 1-27 are rejected in the Final Office Action that issued October 31, 2008. No Advisory Action has been received although an Amendment After Final Action was submitted on December 16, 2008. Claims 1-27 are the subject of this appeal.

STATUS OF AMENDMENTS

An Amendment After Final Action was submitted on December 16, 2008 in response to a Final Office Action mailed on October 16, 2008. The Amendment After Final Action did not include any amendments. No Advisory Action has been received although an Amendment After Final Action was submitted on December 16, 2008 as noted above, six months prior to this Brief. Claims 1-27 are the subject of this appeal. This Appeal Brief is in response to the Final Office Action mailed on October 16, 2008, that finally rejected claims 1-27.

SUMMARY OF CLAIMED SUBJECT MATTER

The present invention, for example as claimed in claim 1, relates to an ultrasonic transducer 10 (e.g., see, Present Application, FIG. 1 and accompanying description contained on page 5, lines 2-4), including a housing 12 (e.g., see, Present Application, page 5, lines 4-7); acoustic elements 22 arranged in the housing 12 (e.g., see, Present Application, page 6, lines 16-17); an integrated circuit 24 arranged in the housing 12 adjacent the acoustic elements 22 (e.g., see, Present Application, page 6, lines 16-18); first connection means 26 for connecting the acoustic elements 22 to the integrated circuit 24 (e.g., see, Present Application, FIGs. 3, 4 and accompanying description contained on page 6, lines 16-29); and second connection means (e.g., short wires/wire bonds 34) for connecting the integrated circuit to electrical transmission lines (e.g., see, Present Application, FIG. 5 and accompanying description contained on page 7, lines 3-6), connection sites for the first and second connection means (26, 34, respectively) and the acoustic elements 22 being arranged on a common surface of the integrated circuit 24 (e.g., see, Present

Application, FIG. 5 and accompanying description contained on page 7, lines 6-8).

The present invention, for example as claimed in claim 8, relates to an ultrasonic transducer 10 including a thermally-conductive body 14 (e.g., see, Present Application, FIG. 1 and accompanying description contained on page 5, lines 9-10); a flexible circuit 16 bent at least partially around the body 14 (e.g., see, Present Application, FIG. 1 and accompanying description contained on page 5, lines 9-10) such that a first portion of the flexible circuit 16 extends in a first direction along the flexible circuit's length and a second portion of the flexible circuit 16 extends in a second direction along the flexible circuit's length that is at least perpendicular to the first direction (e.g., see, Present Application, FIG. 1 and accompanying description contained on page 5, line 30); an acoustic assembly 22 connected to the flexible circuit 16 (e.g., see, Present Application, FIG. 5 and accompanying description contained on page 9, lines 14-15); electronic components 36 for controlling the acoustic assembly 22 (e.g., see, Present Application, FIG. 1 and accompanying description contained on page 7, lines 28-30); and connection means (flexible circuits 40, 42 and connector pads 44)

for connecting signal transmission lines 38 to the flexible circuit 16 (e.g., see, Present Application, FIG. 1 and accompanying description contained on page 8, lines 10-17), the acoustic assembly 22, the electronic components 36 and the signal transmission lines 38 being connected in a circuit defined in part by the flexible circuit 16 with one of the electrical components 36 being an integrated circuit (e.g., see, Present Application, FIG. 1 and accompanying description contained on page 9, lines 4-5), the acoustic assembly being positioned on a surface of the integrated circuit (e.g., see, Present Application, FIG. 5 and accompanying description contained on page 7, lines 6-8).

The present invention, for example as claimed in claim 23, relates to an ultrasonic transducer 10, including a flexible circuit 16 having connection sites 30 (e.g., see, Present Application, FIG. 5 and accompanying description contained on page 9, lines 14-15); an acoustic assembly 20 mounted on the flexible circuit 16 (e.g., see, Present Application, FIGs. 3, 4 and accompanying description contained on page 6, lines 16-29 and page 7, lines 3-6) and including an integrated circuit 24 having connection sites 32 and acoustic elements 22 electrically coupled to the integrated circuit 24 (e.g., see, Present Application, FIGs.

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3, 4, bumps 26 and accompanying description contained on page 6, lines 16-29); electronic components 36 for controlling the acoustic assembly 20 to transmit and receive ultrasonic waves (e.g., see, Present Application, FIG. 1 and accompanying description contained on page 7, lines 28-30), the acoustic assembly 20 and the electronic components 36 being connected in a circuit defined in part by the flexible circuit 16 (e.g., see, Present Application, FIG. 1 and accompanying description contained on page 9, lines 4-5); and wire-bonds 34 connecting the connection sites 32 of the integrated circuit 24 and the connection sites 30 of the flexible circuit 16 (e.g., see, Present Application, FIG. 5 and accompanying description contained on page 7, lines 3-6), wherein the connection sites 32 of the integrated circuit 24 are positioned on and above a same side of the integrated circuit as the acoustic assembly 22 which is also positioned on the integrated circuit 24 (e.g., see, Present Application, FIGs. 1, 5), the electronic components 36 being positioned below the same side of the integrated circuit 24 (e.g., see, Present Application, FIG. 1 and page 7, lines 28-29).

The present invention, for example as claimed in claim 26, relates to a method for manufacturing an ultrasonic transducer 10, including arranging an acoustic assembly 20 on a flexible circuit

16 that extends along a first axis (e.g., see, Present Application, FIG. 1); coupling electronic components 36 for controlling the acoustic assembly 20 to the acoustic assembly 20 via the flexible circuit 16 (e.g., see, Present Application, FIG. 1 and page 7, lines 28-29); coupling signal transmission lines 38 to the flexible circuit 16 such that the electronic components 36, the acoustic assembly 20 and the signal transmission lines 38 are connected in a circuit defined in part by the flexible circuit 16 (e.g., see, Present Application, FIG. 1 and accompanying description contained on page 9, lines 4-5); and bending the flexible circuit 16 at least partially around a thermally-conductive body 14 to form at least one 180° bend about the body 14 (e.g., see, Present Application, FIG. 1 and accompanying description contained on page 5, lines 9-10) with the acoustic assembly 20 being spaced from the electronic components 36 along a second axis that extends substantially perpendicular to the first axis (e.g., see, Present Application, FIG. 1) and both the acoustic assembly 20 and the electronic components 36 are positioned, with respect to each other, along the second axis (e.g., see, Present Application, FIG. 1).

It should be explicitly noted that it is not the Appellants' intention that the currently claimed device and method be limited

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to operation within the illustrative device and method described above beyond what is required by the claim language. Further description of the illustrative device and method is provided above indicating portions of the claims which cover the illustrative device and method merely for compliance with requirements of this appeal without intending any further interpreted limitations be read into the claims as presented.

GROUND OF REJECTION TO BE REVIEWED ON APPEAL

Whether claims 1-5 and 23-25 of U.S. Patent Application Serial No. 10/537,891 are obvious under 35 U.S.C. §103(a) over U.S. Patent No. 5,947,905 to Hadjicostis ("Hadjicostis") in view of U.S. Patent No. 6,049,958 to Eberle ("Eberle").

Whether claims 6-22 and 26-27 of U.S. Patent Application Serial No. 10/537,891 is obvious under 35 U.S.C. §103(a) over Hadjicostis in view of Eberle and further in view of U.S. Patent No. 7,022,080 to Marian ("Marian").

ARGUMENT

Claims 1-5 and 23-25 are said to be obvious over Hadjicostis in view of Eberle.

Appellants respectfully request the Board to address the patentability of independent claims 1, 8 and 23, and further claims 2-7, 9-22 and 24-25 as respectively depending from one of independent claims 1, 8 and 23, based on the requirements of independent claims 1, 8 and 23. This position is provided for the specific and stated purpose of simplifying the current issues on appeal. However, Appellants herein specifically reserve the right to argue and address the patentability of claims 2-7, 9-22 and 24-25 at a later date should the separately patentable subject matter of claims 2-7, 9-22 and 24-25 later become an issue. Accordingly, this limitation of the subject matter presented for appeal herein, specifically limited to discussions of the patentability of independent claims 1, 8 and 23 is not intended as a waiver of Appellants' right to argue the patentability of the further claims and claim elements at that later time.

It is undisputed that Hadjicostis fails to disclose or suggest "the use of one common surface of the integrated surface for placement of both the acoustic elements and connection means ...". (See, Office Action, page 4, first full paragraph.) While Eberle is relied on for showing that which is not disclosed or suggested by Hadjicostis, it is respectfully submitted that continued reliance on Eberle is misplaced.

The Final Office Action notes on page 5 continuing onto page 6 in a Response to Arguments section that (emphasis added) "Applicant has noted that the transducer elements are positioned away from the IC chips in figure 1 of Eberle et al. While this is true, the two components still share a common surface, which is what is currently being claimed."

It is respectfully submitted that the above statement from the Final Office Action is a misstatement of what is "currently being claimed." What is recited for example in claim 1 of the pending patent application is that (emphasis added) "connection sites for said first and second connection means and said acoustic elements being arranged on a common surface of said integrated circuit."

Accordingly, while the integrated circuit (6) in Eberle, FIG. 1, shares a common surface with the transducer elements (8), it is

a common surface of the flexible circuit. Further, as clear from FIG. 1, the transducer (8) is not arranged on a common surface of the integrated circuit (6) as recited in the claims. In fact, as previously pointed out, FIG. 1 of Eberle unquestionably shows that the transducer elements (8) are positioned away from the IC chips (6), a point which is undisputed in the Final Office Action. Accordingly, it is not clear how the Final Office Action can maintain that Eberle shows the acoustic elements (transducer elements (8) of Eberle) are arranged on a surface of the integrated circuit (IC chips (6) of Eberle), when it is admitted in the Final Office Action that the transducer elements (8) are positioned away from the IC chips (6).

In view of the above, it is respectfully submitted that the ultrasonic transducer of claim 1 is not obvious in light of Hadjicostis in view of Eberle. For example, Hadjicostis in view of Eberle does not disclose or suggest, an ultrasonic transducer that amongst other patentable elements, comprises (illustrative emphasis provided) "first connection means for connecting said acoustic elements to said integrated circuit; and second connection means for connecting said integrated circuit to electrical transmission lines, connection sites for said first and second connection means

and said acoustic elements being arranged on a common surface of said integrated circuit" as recited in Claim 1, and as similarly claimed in claims 8 and 23.

Based on the foregoing, the Appellants respectfully submit that independent claims 1, 8 and 23 are patentable over Hadjicostis in view of Eberle and notice to this effect is earnestly solicited.

Claims 2-7, 9-22 and 24-25 respectively depend from one of claims 1, 8 and 23 and accordingly are allowable for at least this reason as well as for the separately patentable elements contained in each of the claims. Accordingly, separate consideration of each of the dependent claims is respectfully requested.

Claims 6-22 and 26-27 are said to be unpatentable over Hadjicostis in view of Eberle and further in view of Marian.

Appellants respectfully request the Board to address the patentability of independent claims 26, and further claims 6-22 and 27 as respectively depending from one of independent claims 1, 8 and 26, based on the requirements of independent claims 1, 8 and 26. This position is provided for the specific and stated purpose of simplifying the current issues on appeal. However, Appellants

herein specifically reserve the right to argue and address the patentability of claims 6-22 and 27 at a later date should the separately patentable subject matter of claims 6-22 and 27 later become an issue. Accordingly, this limitation of the subject matter presented for appeal herein, specifically limited to discussions of the patentability of independent claims 1, 8 and 26 is not intended as a waiver of Appellants' right to argue the patentability of the further claims and claim elements at that later time.

Marian is cited for allegedly showing elements of the dependent claim yet does not cure the deficiencies in each of Hadjicostis and Eberle. Accordingly, it is respectfully submitted that claims 6-22 are allowable at least based on respective dependence from one of independent claims 1 and 8 as discussed above.

It is further respectfully submitted that Hadjicostis in view of Eberle and Marian does not disclose or suggest, a method for manufacturing an ultrasonic transducer that amongst other patentable elements, comprises (illustrative emphasis added) "arranging an acoustic assembly on a flexible circuit that extends along a first axis; ... and bending the flexible circuit at least

partially around a thermally-conductive body to form at least one 180° bend about the body with the acoustic assembly being spaced from the electronic components along a second axis that extends substantially perpendicular to the first axis and both the acoustic assembly and the electronic components are positioned, with respect to each other, along the second axis" as recited in Claim 26.

It is undisputed that Hadjicostis in view of Eberle fails to disclose several elements of claims 6 (See, Final Office Action, page 5.). The Final Office Action relies on Marian (FIG. 2, Col. 3, line 30 through Col. 4, line 45 and Col. 7, line 35 through Col. 8, line 12) as disclosing these elements. However, it is respectfully submitted that reliance on Marian, for supplying that which is admitted in the Office Action as deficient in Hadjicostis in view of Eberle, is misplaced.

For example, in the Final Office Action in a response to Arguments section contained on page 6, it is indicated that "[w]ith respect to each other, the transducer elements and the electrical components are positioned along a second axis (the 180 degree bend ensures this, Figure 2)." While, some axis may be drawn that the transducer elements and the electrical components are spaced apart along, it is respectfully submitted that the recitation of claim 26

provides that the second axis, which the transducer elements and the electrical components are spaced along, extends substantially perpendicular to the first axis which the flexible circuit extends along.

In contrast, the acoustic assembly and the electronic components of Marian are not spaced with respect to each other along a second axis that is perpendicular to the axis that the flexible circuit extends. As shown by FIG. 2 of Marian, the flexible circuit 100 extends along an axis (a first axis) that extends in the same direction (either same axis or at least an axis parallel to) as an axis which the acoustic assembly is spaced from the electronic components (the second axis in terms of claim 26).

Accordingly, it is respectfully submitted that Hadjicostis in view of Eberle in further view of Marian does not disclose or suggest, a method for manufacturing an ultrasonic transducer that amongst other patentable elements, comprises (illustrative emphasis added) "arranging an acoustic assembly on a flexible circuit that extends along a first axis; ... and bending the flexible circuit at least partially around a thermally-conductive body to form at least one 180° bend about the body with the acoustic assembly being spaced from the electronic components along a second axis that extends

substantially perpendicular to the first axis and both the acoustic assembly and the electronic components are positioned, with respect to each other, along the second axis" as recited in Claim 26.

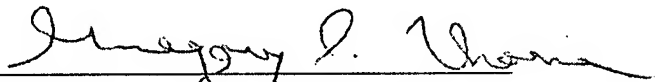
Based on the foregoing, the Applicants respectfully submit that independent Claims 1, 8, 23 and 26 are patentable over Hadjicostis in view of Eberle alone, and in view of Marian and notice to this effect is earnestly solicited. Claims 2-7, 9-22, 24-25 and 27 respectively depend from one of Claims 1, 8, 23 and 26 and accordingly are allowable for at least this reason as well as for the separately patentable elements contained in each of the claims. Accordingly, separate consideration of each of the dependent claims is respectfully requested.

In addition, Appellants deny any statement, position or averment of the Examiner that is not specifically addressed by the foregoing argument and response. Any rejections and/or points of argument not addressed would appear to be moot in view of the presented remarks. However, the Appellants reserve the right to submit further arguments in support of the above stated position, should that become necessary. No arguments are waived and none of the Examiner's statements are conceded.

CONCLUSION

Claims 1-27 are patentable over any of Hadjicostis in view of Eberle alone, and in view of Marian. Thus the Examiner's rejection of claims 1-27 should be reversed.

Respectfully submitted,

By 

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APPENDIX A

CLAIMS ON APPEAL

1. (Previously presented) An ultrasonic transducer, comprising:

a housing;

acoustic elements arranged in said housing;

an integrated circuit arranged in said housing adjacent said acoustic elements;

first connection means for connecting said acoustic elements to said integrated circuit; and

second connection means for connecting said integrated circuit to electrical transmission lines, connection sites for said first and second connection means and said acoustic elements being arranged on a common surface of said integrated circuit.

2. (Original) The ultrasonic transducer of claim 1, wherein each of said first and second connection means are comprised of at least one of metal bumps, solder bumps, polymer bumps, thin-line bonding, z-axis conductive elastomeric connectors, z-axis conductive adhesive, z-axis conductive film and reflow solder.

3. (Original) The ultrasonic transducer of claim 1, wherein said first connection means are comprised of at least one of metal bumps, solder bumps, polymer bumps, thin-line bonding, z-axis conductive elastomeric connectors, z-axis conductive adhesive, z-axis conductive film and reflow solder, and said second connection means are different from said first connection means and are comprised of at least one of wire-bonds, direct wire attachments and tab bonding of leads.

4. (Original) The ultrasonic transducer of claim 1, wherein said second connection means comprise an intermediate interconnection substrate comprising a thin film circuit, ceramic circuit, laminate circuit technology.

5. (Previously presented) The ultrasonic transducer of claim 1, wherein said second connection means comprise an intermediate interconnection substrate comprising a semi-rigid circuit comprising flexible and rigid circuit portions.

6. (Previously presented) The ultrasonic transducer of claim 5, wherein said interconnection substrate is bent such that a vertical

size of an assembly of said acoustic elements, said integrated circuit and said interconnection substrate is less than seventy-five percent of a horizontal length of said integrated circuit and such that a first portion of said interconnection substrate extends in a first direction along a length of said second connection means and a second portion of said interconnection substrate extends in a second direction along said length of said second connection means at an angle that is at least perpendicular to said first direction.

7. (Original) The ultrasonic transducer of claim 5, wherein said interconnection substrate is bent such that a vertical size of an assembly of said acoustic elements, said integrated circuit and said interconnection substrate is less than fifty percent of a horizontal length of said integrated circuit.

8. (Previously presented) An ultrasonic transducer, comprising:
a thermally-conductive body;
a flexible circuit bent at least partially around said body such that a first portion of said flexible circuit extends in a first direction along said flexible circuit's length and a second portion of said flexible circuit extends in a second direction

along said flexible circuit's length that is at least perpendicular to said first direction;

an acoustic assembly connected to said flexible circuit;

electronic components for controlling said acoustic assembly;

and

connection means for connecting signal transmission lines to said flexible circuit,

said acoustic assembly, said electronic components and the signal transmission lines being connected in a circuit defined in part by said flexible circuit with one of said electrical components being an integrated circuit, said acoustic assembly being positioned on a surface of the integrated circuit.

9. (Previously presented) The ultrasonic transducer of claim 8, wherein said flexible circuit is bent around said body such that a first portion of said flexible circuit that extends in said first direction is on a first side of said body and a second portion of said flexible circuit that extends in said second direction is on a second side of said body opposite said first side of said body.

10. (Previously presented) The ultrasonic transducer of claim 9, wherein said acoustic assembly is arranged on a first portion of said electronic components and said first portion of said flexible circuit and a second portion of said electronic components are arranged on said second portion of said flexible circuit.

11. (Original) The ultrasonic transducer of claim 8, wherein said acoustic assembly is arranged in contact with said body.

12. (Previously presented) The ultrasonic transducer of claim 10, wherein said body defines a cavity, said second portion of said electronic components being arranged on said flexible circuit and in said cavity.

13. (Previously presented) The ultrasonic transducer of claim 8, wherein said flexible circuit has a 180° bend around said body such that said first portion of said flexible circuit is arranged on a first side of said body and said second portion of said flexible circuit is arranged on a second side of said body opposite said first side of said body and wherein said first direction extends in an opposite direction of said second direction.

14. (Previously presented) The ultrasonic transducer of claim 8, wherein said acoustic assembly includes acoustic elements and an integrated circuit electrically coupled to said acoustic elements, said flexible circuit having connection sites and said integrated circuit having connection sites, further comprising wire-bonds connecting said connection sites of said integrated circuit and said connection sites of said flexible circuit, wherein said acoustic elements are positioned on said integrated circuit.

15. (Previously presented) The ultrasonic transducer of claim 14, wherein two rows of said wire-bonds are formed along each of a pair of opposed edges of said integrated circuit on a same side as said acoustic elements.

16. (Previously presented) The ultrasonic transducer of claim 8, wherein said flexible circuit has a plurality of bends about said body such that said first portion of said flexible circuit extends over a first side of said body and said second portion of said flexible circuit extends over a second side of said body.

17. (Original) The ultrasonic transducer of claim 8, wherein said flexible circuit has first and second planar portions on opposite sides of said body separated by a 180° bend and first and second terminal end portions each separated from a respective one of said first and second planar portions by a 180° bend.

18. (Original) The ultrasonic transducer of claim 17, wherein said connection means comprise two additional flexible circuits, each having connections for signal transmission lines, and conductive film adhesive attaching each of said additional flexible circuits to a respective one of said first and second terminal end portions of said flexible circuit.

19. (Original) The ultrasonic transducer of claim 18, wherein said flexible circuit has a flap portion separated from said first planar portion of said flexible circuit by a 180° bend, said connection means further comprise one additional flexible circuit having connections for signal transmission lines and conductive film or adhesive attaching said additional flexible circuit to said flap portion of said flexible circuit.

20. (Original) The ultrasonic transducer of claim 8, wherein said flexible circuit has a planar portion on one side of said body and a flap portion separated from said planar portion by a 180° bend, said connection means further comprise an additional flexible circuit having connections for signal transmission lines and conductive film or adhesive attaching said additional flexible circuit to said flap portion of said flexible circuit.

21. (Original) The ultrasonic transducer of claim 8, wherein said flexible circuit has first and second planar portions on opposite sides of said body separated by a 180° bend and a first terminal end portion separated from said first planar portion by a 180° bend, said second planar portion of said flexible circuit being a terminal portion of said flexible circuit.

22. (Original) The ultrasonic transducer of claim 21, wherein said connection means comprise an additional flexible circuit having connections for the signal transmission lines, and conductive film adhesive attaching said additional flexible circuit to said flexible circuit.

23. (Previously presented) An ultrasonic transducer, comprising:

a flexible circuit having connection sites;

an acoustic assembly mounted on said flexible circuit and comprising an integrated circuit having connection sites and acoustic elements electrically coupled to said integrated circuit;

electronic components for controlling said acoustic assembly to transmit and receive ultrasonic waves, said acoustic assembly and said electronic components being connected in a circuit defined in part by said flexible circuit; and

wire-bonds connecting said connection sites of said integrated circuit and said connection sites of said flexible circuit, wherein said connection sites of said integrated circuit are positioned on and above a same side of said integrated circuit as said acoustic assembly which is also positioned on said integrated circuit, said electronic components being positioned below the same side of said integrated circuit.

24. (Original) The ultrasonic transducer of claim 23, wherein said wire-bonds are formed along only a portion of the periphery of said integrated circuit.

25. (Original) The ultrasonic transducer of claim 23, wherein two rows of said wire-bonds are formed along each of a pair of opposed edges of said integrated circuit.

26. (Previously presented) A method for manufacturing an ultrasonic transducer, comprising the steps of:

arranging an acoustic assembly on a flexible circuit that extends along a first axis;

coupling electronic components for controlling the acoustic assembly to the acoustic assembly via the flexible circuit;

coupling signal transmission lines to the flexible circuit such that the electronic components, the acoustic assembly and the signal transmission lines are connected in a circuit defined in part by the flexible circuit; and

bending the flexible circuit at least partially around a thermally-conductive body to form at least one 180° bend about the body with the acoustic assembly being spaced from the electronic components along a second axis that extends substantially perpendicular to the first axis and both the acoustic assembly and the electronic components are positioned, with respect to each other, along the second axis.

27. (Previously presented) The method of claim 26, wherein the acoustic assembly and electronic components are arranged on the flexible circuit when the flexible circuit is in a flat form and the body has a cavity, the flexible circuit being bent to place the electronic components in the cavity.

APPENDIX B

Evidence on Appeal

None

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APPENDIX C

Related Proceedings of Appeal

None